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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,746	12/03/2003	Heng Liu	M-15626-1D US	8880
32605	7590	09/15/2009		
Haynes and Boone, LLP IP Section 2323 Victory Avenue SUITE 700 Dallas, TX 75219			EXAMINER	
			KACKAR, RAM N	
			ART UNIT	PAPER NUMBER
			1792	
			MAIL DATE	DELIVERY MODE
			09/15/2009 PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/727,746

**Applicant(s)**

LIU, HENG

**Examiner**

Ram N. Kackar

**Art Unit**

1792

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 16.63-87.89-103.131 and 132 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16.63-87.89-103.131 and 132 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(c) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/12/2009 has been entered.

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 16, 63-87, 89-103 and 131-132 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In this instance in the new amendment “and a top portion of the chamber cooperate to define a generally flat, continuous and unobstructed flow channel” and “effecting generally laminar flow of gas through the flow channel intermediate the top portion of the chamber and the wafer carrier” the underlined part is new matter.

Applicant points to drawing 5 and paragraph 88, 93, 94 and 98 for its support.

It is noted that there is no mention of a top portion cooperating to get an unobstructed..... flow, in the specification.

Further, this can not be assumed to be the intention of the specification, since the structural requirement for laminar flow is cited to be only to have outlets above the surface of the wafer carrier.

Regarding drawing 5, reliance only on this drawing is improper, since the drawing is a mere schematic and is neither according to scale nor show any details.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 63-67, 71-75, 78-84, 87, 89 -93 and 96 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jurgensen et al (WO 02/18672).**

Jurgensen et al disclose a CVD coating device having a rotatable wafer carrier (Fig 1 and paragraph 7) to process a plurality of substrates sealed at a periphery to facilitate laminar flow (Fig 1), bottom of the chamber defined by the carrier (Fig 1-3), induction (high frequency) heater

outside the chamber (19) to heat the carrier, gas inlet located centrally (26) and gas outlets above the carrier (25), a shaft for rotating the wafer carrier (23), a small distance from carrier to the cover (Fig 1) and a graphite discharge ring (Col 1 lines 8-13). Sealing is by the diffusion ring (14). Jurgensen et al further disclose that the diffusion ring is made in the same way as support plate, tension plate, carrier plate and cover plate (para. 16) which are shown to be made of graphite with SiC coating. The flow of reactant gases is laminar since there is no obstruction in the flow until exhaust out of the chamber.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 16 and 131-132 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Tabata et al (US 2003/0133854).**

Jurgensen et al disclose a CVD coating device having a rotatable wafer carrier (Fig 1 and paragraph 7) to process a plurality of substrates sealed at a periphery to facilitate laminar flow (Fig 1), bottom of the chamber defined by the carrier (Fig 1-3).

Jurgensen et al do not disclose plurality of chambers where this type of rotatable wafer carrier could be installed. It would however be obvious to have such carriers installed in plurality of chambers for increased throughput.

Tabata et al disclose a plurality of small chambers for chemical vapor deposition (Fig 2 501, 502 and 503) connected to common gas supply of nitrogen through flow controllers 611-613 and ozone through flow controllers 401-403 and a common exhaust 71.

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to have plurality of chambers having common processing gas input and common exhaust to each have wafer carriers of the Jurgensen type.

**8. Claims 63-87, 89-93 and 96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Ikeda et al (JP 62211914).**

Jurgensen et al disclose a CVD coating device having a rotatable wafer carrier (Fig 1 and paragraph 7) to process a plurality of substrates (*disclosed number is 5*) sealed at a periphery to facilitate laminar flow (Fig 1), bottom of the chamber defined by the carrier (Fig 1-3), induction (high frequency) heater outside the chamber (19) to heat the carrier, gas inlet located centrally (26) and gas outlets above the carrier (25), a shaft for rotating the wafer carrier (23), a small distance from carrier to the cover (Fig 1) and a graphite discharge ring (Col 1 lines 8-13). Sealing is by diffusion ring which works both as a seal ring and diffusion ring (14). Jurgensen et al further disclose that the diffusion ring is made in the same way as support plate, tension plate, carrier plate and cover plate (para. 16) which are shown to be made of graphite with SiC coating.

Regarding the distance between the wafer carrier and top of the chamber, diameter of the gas inlet and speed of rotation of the carrier, these are result effective parameters and their optimization would be obvious for one of ordinary skill in the art at the time of invention.

Jurgensen et al disclose discharge ring for allowing gases to pass symmetrically over the substrate but do not disclose that the outlets through a hollow ring to collect for disposal.

Ikeda et al disclose a diffuser, which is a hollow ring with plurality of inlets and outlets (Fig 2 B and C).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to use a hollow ring to guide exhaust gases out of the chamber in order to have an orderly and laminar removal of exhaust gases.

**9. Claims 94-95 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of MacLeish et al (US 6113984).**

Jurgensen et al disclose inductive heating which is equivalent to radiation heating.

MacLeish et al disclose a CVD coating device having a rotatable wafer carrier (Fig 14-116, Fig 1-48) sealed at a periphery to facilitate laminar flow (Abstract, Fig 14-130 and Col 14 lines 55-59), bottom of the chamber defined by the carrier (Fig 14-115, Fig 1-50), heater outside the chamber (Fig 2-44 and Fig 14-124) to heat the carrier, a shaft for rotating the wafer carrier (Fig 14-116, Fig 1-48) and a small distance from carrier to top (Fig 14-106, Fig 1-34a)

Regarding claim 95 MacLeish discloses purge of the area outside of reaction chamber 34a (Col 9 lines 53-60).

Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to use radiant heating instead of inductive heating as being equivalent.

**10. Claims 97-103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Van de Walle et al (20020054745).**

Jurgensen et al do not disclose using alkyl and ammonia gas and do not teach the possibility of parasitic pre-reaction between the two.

Van de Walle et al disclose an MOCVD coating device having a rotatable wafer carrier (Fig 17 and paragraph 49) to process substrates using alkyl gas like trimethylaluminum and ammonia (Paragraph 38 and 49) and teach that to prevent pre-reaction between alkyl gas and ammonia gases are introduced in the chamber separately- ammonia from inlet 1720 and alkyl gas from 1710 (Paragraph 49) to reduce requirement of carrier gas like Hydrogen.

Therefore keeping alkyl gas and ammonia separate until needed for deposition reaction would have been obvious for one of ordinary skill in the art at the time of invention.

**11. Claims 97-103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jurgensen et al (WO 02/18672 or US 2003/0221624) in view of Van de Walle et al (20020054745) and further in view of Hirooka (US 4812331).**

Jurgensen et al in view of Van de Walle et al disclose keeping alkyl gas and ammonia separate and disclose a structure for doing that but not as explicit as claimed.



Hirooka et al disclose a deposition system having multiple gas inlets separated from each other and concentric to each other (Fig 1) and disclose several ways of connecting gas supplies before entering the chamber (Fig 1) which includes pre-mixing as well as mixing only at the entrance of the chamber through concentric tubes (a, b, c).

Therefore connecting inlets separately as in Hirooka et al so as to prevent parasitic pre-reaction would be obvious to one of ordinary skill in the art at the time of invention.

### ***Response to Arguments***

Applicant's arguments filed 8/12/2009 have been fully considered but they are not persuasive.

Applicant's arguments regarding Sec 112 rejection are not persuasive. Applicant argues that the amendment finds support in Fig 5 and paras. 88, 93 and 94.

None of these paragraphs suggest that the wafer carrier and a top portion of each chamber cooperate to define a generally flat, continuous and unobstructed flow channel such that rotating the wafer carrier effects generally laminar flow of gas through the flow channel intermediate the top portion of each chamber and the wafer carrier.

For example according to the specification:

**“the laminar flow is produced, by forming the reaction gas outlet(s) such that they are entirely above the upper surface of the wafer carrier. By forming the gas outlet entirely above the upper surface of the wafer carrier 116, a more direct route (and thus less contorted) for the reaction gas from the gas inlet 112 to the gas outlet 119 is provided.**

In Jurgensen et al the gas outlets are entirely above the upper surface of the wafer carrier.

Applicant's argument that in Jurgensen et al, gas admission section is not part of the top portion of the chamber (See the para bridging page 13 and 14) is not understood.

Applicant argues further that since gas inlet is projecting in to the chamber it teaches away from a flat continuous and unobstructed flow channel. This argument has no basis either in the specification or in common knowledge available in the art. For example the structure of gas inlet in Fig 8 of the specification does not appear to prevent a laminar flow.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N. Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571 272 1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).